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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,304	09/18/2003	Madapusi K. Keshavan	49524/CM/M277	5445

23363 7590 02/21/2007
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EXAMINER

MAYES, MELVIN C

ART UNIT	PAPER NUMBER
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1734

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/665,304

Applicant(s)

KESHAVAN ET AL.

Examiner

Melvin Curtis Mayes

Art Unit

1734

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-12 and 25-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-12 and 25-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

(1)

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 24, 2006 has been entered.

Claim Rejections - 35 USC § 103

(2)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(3)

Claims 1, 7-12 and 34-36 are rejected under 35 U.S.C. 103(a) as obvious over Komanduri 4,797,138.

Komanduri discloses a method of making a cutting tool comprising: providing crystals of diamond (ultra hard material which is not fully densified); providing a cemented carbide substrate of desired density of porosity of less than 15% by volume (encompassing substrate which has density less 100% of full density); providing the substrate with at least one partition which divides the support surface of the substrate into at least two discrete support areas (non-uniform face); filling the support areas with a layer of the crystals of diamond (ultra hard

material); and heating under high pressure and high temperature of 1300-1600°C and at least 50 kilobars to a temperature above the melting point of the cementing agent of the cemented carbide to bond the crystal together and to the substrate to produce a composite (sintering); and slicing through the partition to form cutting tools (col. 2-4).

By providing a cemented carbide substrate of desired density to a porosity of up to 15% and thus a substrate having a density less than 100% of full density, such as overlapping the ranges of 70-90%, 40-90% or 75-99% of full density as claimed in Claims 7-10 or overlapping the range of 1-30% porosity as claimed in Claim 11, a substrate is obviously provided having a density selected which provides a desired level of constraint to the shrinkage of the ultra hard material during sintering as claimed, which minimizes the constraint provided to the shrinkage as claimed in Claim 34 and which minimizes shrinkage difference as claimed in Claim 35. As disclosed by Applicant, a reduction in the shrinkage constraint (the desired level) of the ultra hard material layer during sintering is by providing a substrate of density in the range of 40-99% of full density or of 1-30% porosity. Komanduri discloses providing a substrate with up to 15% porosity, thus providing a range of substrates which encompasses substrates having density which will obviously reduce shrinkage constraint of ultra hard material during the sintering process and thus provide the desired level of constraint.

(4)

Claims 1, 7 and 34-36 are rejected under 35 U.S.C. 103(a) as obvious over Boyce 6,845,828.

Boyce disclose a method of making a cutting insert comprising: providing diamonds mixed with tungsten carbide (ultra hard material which is not fully densified); providing a green

Art Unit: 1734

insert comprising pellets of tungsten carbide pre-sintered at low temperature sufficient to permit handling, or optionally a fully sintered insert; coating a layer of the diamonds mixed with tungsten carbide on the cutting surface of the insert; and subjecting the insert to high pressure and high temperature to produce a fully densified insert having a well-bonded diamond-containing surface layer (col. 3-4).

By providing a green insert instead of a fully sintered insert and thus a substrate having a density less than 100% of full density as claimed, a substrate is obviously provided having a density selected which provides a desired level of constraint to the shrinkage of the ultra hard material during sintering as claimed, which minimizes the constraint provided to the shrinkage as claimed in Claim 34 and which minimizes shrinkage difference as claimed in Claim 35. As disclosed by Applicant, a reduction in the shrinkage constraint (the desired level) of the ultra hard material layer during sintering is by providing a substrate of density in the range of 40-99% of full density or of 1-30% porosity. Boyce discloses providing a green insert which is only presintered to permit handling but not fully sintered as well as providing a fully sintered insert, thus providing a range of substrates which encompasses substrates having density which will obviously reduce shrinkage constraint of ultra hard material during the sintering process and thus provide the desired level of constraint.

(5)

Claims 1-3, 6-12, 25-33 and 37-39 are rejected under 35 U.S.C. 103(a) as obvious over Eyre et al. 6,193,001.

Eyre et al. disclose a method of making a cutter comprising: providing an embossed sheet of ultra hard material such as diamond and binder (ultra hard material which is not fully

Art Unit: 1734

densified); providing a substrate comprising an embossed sheet of tungsten carbide particles and binder and a presintered tungsten carbide substrate body (thus a substrate having a non-uniform face on the substrate material); placing the sheet of ultra hard material on the embossed face of the substrate; and sintering under high pressure and high temperature to bond the substrate material sheet and the ultra hard material to bond completely to each other and to the substrate body (col. 3-4).

By providing a substrate comprising an embossed sheet of tungsten carbide particles and binder and a presintered tungsten carbide substrate body, and thus a substrate of first portion having first density less than 100% and second portion of different second density or fully dense, a substrate is obviously provided having a first portion of density selected which provides a desired level of constraint to the shrinkage of the ultra hard material during sintering as claimed, which controls residual stresses as claimed in Claim 33, which minimizes the constraint provided to the shrinkage as claimed in Claim 37 and which minimizes shrinkage difference as claimed in Claim 38. As disclosed by Applicant, a reduction in the shrinkage constraint (the desired level) of the ultra hard material layer during sintering is by providing a substrate of at least a portion which has a density in the range of 40-99% of full density or of 1-30% porosity. Eyre et al. discloses providing a substrate having a sheet of carbide particles and binder, which substrate encompasses substrates having a portion with density which will obviously reduce shrinkage constraint of ultra hard material during the sintering process and thus provide the desired level of constraint.

(6)

Claims 1-3, 6, 8-11, 25-31, 32, 33, 37 and 38 are rejected under 35 U.S.C. 103(a) as obvious over JP 53-134804.

JP 53-134804 discloses a method of making a cutting tool comprising: providing a pressed material of boron nitride and ceramic material (ultra hard material which is not fully densified); providing a substrate comprising a press-molded layer, half-sintered or sintered layer of ultra-hard alloy placed on at least one side of a parent body of ultra-hard alloy; placing the pressed material on the press-molded layer, half-sintered or sintered layer of ultra-hard alloy; and hot-press sintering under high pressure and high temperature (Abstract, Figure 2).

By providing a substrate comprising a press-molded or half-sintered layer of ultra-hard alloy and parent body of ultra-hard alloy, and thus a substrate of first portion having first density less than 100% and second portion of different second density or fully dense, a substrate is obviously provided having a first portion of density selected which provides a desired level of constraint to the shrinkage of the ultra hard material during sintering as claimed, which controls residual stresses as claimed in Claim 33, which minimizes the constraint provided to the shrinkage as claimed in Claim 37 and which minimizes shrinkage difference as claimed in Claim 38. As disclosed by Applicant, a reduction in the shrinkage constraint (the desired level) of the ultra hard material layer during sintering is by providing a substrate of at least a portion which has a density in the range of 40-99% of full density or of 1-30% porosity. JP 53-134804 discloses providing a substrate having a press-molded, half-sintered or sintered layer, which range of substrates encompasses substrates having a portion with density which will obviously

Art Unit: 1734

reduce shrinkage constraint of ultra hard material during the sintering process and thus provide the desired level of constraint.

(7)

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 53-134804 as applied to claim 1, and further in view of Araki et al. 4,437,800.

JP 53-134804 disclose providing the substrate as a press-molded or half-sintered alloy layer on at least one side of the parent body of the alloy (tungsten carbide-cobalt alloy).

Araki et al. teach that a cutting tool can consist of a boron nitride layer surrounding a center portion of tungsten carbide-cobalt alloy at the side surface of side surface and upper and lower surfaces.

It would have been obvious to one of ordinary skill in the art to have provided the press-molded or half-sintered tungsten carbide-cobalt alloy on the side surface as well as the upper and lower surfaces of the parent body for bonding to the pressed material of boron nitride, as Araki et al. teach that a cutting tool can have the boron nitride layer surrounding the tungsten carbide-cobalt alloy body on its side surface and upper and lower surfaces to form a cutting tool. By providing the press-molded or half-sintered alloy layer on all surfaces of the parent body, the substrate comprises an outer portion of density less than 100% surrounding an inner portion that is fully densified, as claimed.

Conclusion

(8)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references teach using a green or partially sintered substrate for sintering with an ultra hard material for making cutting tools.

(9)


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

Art Unit: 1734

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM

February 16, 2007